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WHAT FORESTRY HAS DONE.

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WHAT FORESTRY HAS DONE.[a]

INTRODUCTION.

Many people in this country think that forestry had never been tried until the Government began to practice it upon the National Forests. Yet forestry is practiced by every civilized country in the world, except China and Turkey. It gets results which can be got in no other way, and which are necessary to the general welfare. Forestry is not a new thing. It was discussed two thousand years ago, and it has been studied and applied with increasing thoroughness ever since.

The principles of forestry are everywhere the same. They rest on natural laws, which are at work everywhere and all the time. It is simply a question of how best to apply these laws to fit local needs and conditions. No matter how widely countries may differ in size, climate, population, industry, or government, provided only they have forests, all of them must come to forestry some time as a matter of necessity.

The more advanced and progressive countries arrive first and go farthest in forestry, as they do in other things. Indeed, we might almost take forestry as a yardstick with which to measure the height of a civilization. On the one hand, the nations which follow forestry most widely and systematically would be found to be the most enlightened nations. On the other hand, when we applied our yardstick to such countries as are without forestry, we could say with a good deal of assurance, by this test alone, "Here is a backward nation."

A singular and suggestive exception is England, which, though provided with mountain and heath lands capable of producing a large part of the wood for home consumption, has, with strange indif-

[a] The author is indebted for his facts to a number of authorities, among which are especially acknowledged: Dr. Max Endres, Handbuch der Forst Politik; W. Schlich, Ph. D., Manual of Forestry, vol. 1; compilations of Dr. B. E. Fernow.

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ference, been leading all nations in volume of wood imports and depending mainly upon foreign sources for her supplies. England has hitherto been able to count with certainty upon outside aid from such near neighbors as Norway and Sweden. This policy has seemed satisfactory to the people in spite of the examples of a more provident policy afforded by rival nations almost at her door. The geographical and economic positions of the country have permitted the government, for the time at least, to ignore measures found necessary for the public welfare in other countries of the same rank.

The countries of Europe and Asia, taken together, have passed through all the stages of forest history and applied all the known principles of forestry. They are rich in forest experience. The lessons of forestry were brought home to them by hard knocks. Their forest systems were built up gradually as the result of hardship. They did not first spin fine theories and then apply those theories by main force. On the contrary, they began by facing disagreeable facts. Every step of the way toward wise forest use, the world over, has been made at the sharp spur of want, suffering, or loss. As a result, the science of forestry is one of the most practical and most directly useful of all the sciences. It is a serious work, undertaken as a measure of relief, and continued as a safeguard against future calamity.

Roughly, those countries which to-day manage their forests on sound principles have passed through four stages of forest experience. At first the forests were so abundant as to be in the way, and so they were either neglected or destroyed. Next, as settlements grew and the borders of the forest receded farther and farther from the places where wood was needed and used, the question of local wood supplies had to be faced, and the forest was spared or even protected. Third, the increasing need of wood, together with better knowledge of the forest and its growth, led to the recognition of the forest as a crop, like agricultural crops, which must be harvested and which should therefore be made to grow again. In this stage silviculture, or the management of the forest so as to encourage its continued best growth, was born. Finally, as natural and industrial progress led to measures for the general welfare, including a wiser and less wasteful use of natural resources, the forest was safeguarded and controlled so as to yield a constant maximum product year after year and from one generation to another. Systematic forestry, therefore, applied by the nation for the benefit of the people and practiced increasingly by farsighted private citizens, comes when the last lesson in the school of forest experience is mastered.

The United States, then, in attacking the problem of how best to use its great forest resources, is not in the position of a pioneer in the field. It has the experience of all other countries to go upon. There

is no need for years of experiment with untried theories. The forest principles which hundreds of years of actual practice have proved right are at its command. The only question is, how should these be modified or extended to best meet American conditions. In the management of the National Forests the Government is not working in the dark. Nor is it slavishly copying European countries. It is putting into practice, in America, and for Americans, principles tried and found correct, which will insure to all the people alike the fullest and best use of all forest resources.

In the following short history of what forestry has done in other countries, it will be possible to give only the chief facts. Yet even in this incomplete review two things stand out with striking clearness. One is that those countries which have gone farthest in the practice of forestry are the ones which to-day are most prosperous, which have the least proportion of waste land, and which have the most promising futures. The other is that those countries which spend most upon their forests receive from them the greatest net returns.

GERMANY.

The German Empire has nearly 35,000,000 acres of forest, of which 31.9 per cent belongs to the State, 1.8 per cent to the Crown, 16.1 per cent to communities, 46.5 per cent to private persons, 1.6 per cent to corporations, and the remainder to institutions and associations. There is a little over three-fifths of an acre of forest for each citizen, and though 53 cubic feet of wood to the acre is produced in a year, wood imports have increasingly exceeded wood exports for over forty years, and 300,000,000 cubic feet, valued at $80,000,000, or over one-sixth of the home consumption is now imported each year. Germany's drains on foreign countries are in the following order: Austria-Hungary, 19,750,000 tons; Russia and Finland, 18,000,000 tons; Sweden, 508,000 tons; the United States, 360,000 tons; Norway, 49,000 tons.[a]

German forestry is remarkable in three ways. It has always led in scientific thoroughness, and now it is working out results with an exactness almost equal to that of the laboratory; it has applied this scientific knowledge with the greatest technical success; and it has solved the problem of securing through a long series of years an increasing forest output and increasing profits at the same time.

Like other advanced European countries, Germany felt the pinch of wood shortage a hundred and fifty years ago, and though this shortage was relieved by the coming of the railroads, which opened up new forests, and by the use of coal, which substituted a new fuel

[a] According to the kind of wood, a ton is equivalent to from about 500 to about 1,000 board feet.

for wood, the warning was heeded, and systematic State forestry was begun. After all, the scare was not a false one, for even to-day Germany is not independent as regards wood, since she has to import one-sixth of all she uses.

In addition to the wood-supply question, Germany was forced to undertake forestry by the need of protecting agriculture and stream flow. The troubles which France was having with her mountain torrents opened the eyes of the Germans to the dangers from floods in their own land. As a result the maintenance of protective forests was provided for by Bavaria in 1852, by Prussia in 1875, and by Württemberg in 1879.

Each State of the German federation administers its own forests. All of the States practice forestry with success. The results obtained by Prussia and Saxony are particularly interesting, for they show how forests may be kept constantly improving under a system of management which yields a handsome profit.[a]

The Prussian forests, covering nearly 7,000,000 acres, are made up much as if we should combine the pineries of the Southern States with the forests of some of our Middle Atlantic and Central States. When forestry was begun a great part of them had been injured by mismanagement, much as our forests have been, and the Prussian foresters had to solve the problem of improving the run-down forests out of the returns from those which were still in good condition. They solved it with striking success. Immense improvement has already taken place and is steadily going on.

The method of management adopted calls for a sustained yield—that is, no more wood is cut than the forest produces. Under this management the growth of the forest, and consequently the amount cut, has risen sharply. In 1830 the yield was 20 cubic feet per acre; in 1865, 24 cubic feet; in 1890, 52 cubic feet, and 1904, 65 cubic feet. In other words, Prussian forest management has multiplied the rate of production threefold in seventy-five years. And the quality of the product has improved with the quantity. Between 1830 and 1904 the percentage of saw timber rose from 19 per cent to 54 per cent.

It is a striking fact in this connection that in the United States at the present time we are using about three times as much timber as our forests grow. If we were everywhere practicing forestry with a resulting improvement equal to that made in Prussia, our forests would be growing as much as we use.

The financial returns in Prussia make an even better showing. Net returns per acre in 1850 were 28 cents. In 1865 they were 72 cents; in 1900, $1.58; and in 1904, $2.50. They are now nearly 10 times what

[a] See Financial Results of Forest Management, by Dr. B. E. Fernow, in Forestry and Irrigation for February, 1907.

they were sixty years ago, and they are increasing more rapidly than ever.

These results have been obtained in Prussia along with almost ideal technical success. When what is wanted is a sustained yield from the forest year by year in the long run, it is clearly necessary to have always a certain number of trees ready to be cut; there must be a proper proportion of trees of all ages. This percentage has been secured and maintained with almost mathematical accuracy.

In Saxony, which has about 430,000 acres of State forests, the increase of cut under forest management, which always means also a corresponding increase in wood produced, has been nearly as marked as in Prussia. The yield rose 55 per cent between 1820 and 1904, and is now 93 cubic feet per acre—greater than that of the Prussian forests. Since the chief wood is spruce, which yields more saw timber than the average of trees making up the Prussian forests, the increase in the percentage of saw timber in Saxony naturally exceeds the increase in Prussia. It increased from 26 per cent in 1830 to 66 per cent in 1904. The net yearly revenue is $5.30 per acre. The yearly expense is $3 per acre.

These figures are in striking contrast with the corresponding ones for the United States, given in the table on page 29. We spent on our National Forests last year $9\frac{3}{10}$ mills per acre, and our net revenue from them was less than $\frac{1}{8}$ mill per acre.

The rise in prices, felt everywhere, accounts only in part for the increased financial returns from forestry in these two States. For while the prices have not quite trebled, the revenue has been multiplied tenfold.

Other German States, smaller, and with better kinds of timber and better market facilities, secure even higher returns. The forests of Württemberg yield a net annual revenue of nearly $6 per acre, and those of several smaller administrations do even better.

A number of the private forests of Germany are managed with great success. As a result of a canvass of 15,600,000 acres of State municipal, and private forests, it was found that the average net revenue per acre, from good, bad, and indifferent land, was $2.40 a year.

What, then, has forestry done in Germany? Starting with forests which were in as bad shape as many of our own which have been recklessly cut over, it raised the average yield of wood per acre from 20 cubic feet in 1830 to 65 cubic feet in 1904. During the same period of time it trebled the proportion of saw timber got from the average cut, which means, in other words, that through the practice of forestry the timberlands of Germany are of three times better quality to-day than when no system was used. And in fifty-four years it increased the money returns from an average acre of forest sevenfold.

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Yet to-day the forests are in better condition than ever before, and under the present system of management it is possible for the German foresters to say with absolute certainty that the high yield and large returns which the forests now give will be continued indefinitely into the future.

FRANCE.

France has not quite 18 per cent of forest—three-fifths of an acre per capita. This is enough to produce only one-third of the home demand. The country imports annually $30,000,000 worth of wood, and pays $6,000,000 duty and $10,000,000 freight for it. This wood comes from Russia, Sweden, Norway, Austria-Hungary, Germany, and America. Of the 23,500,000 acres of French forests the State owns 2,707,000, and the Departments and communes 3,472,000. Since 1827, when the forest code was passed, the State and communal forests have been under management. The State forests yield a clear profit of $4,737,250 a year, or $1.75 per acre; $0.95 is spent for the management of each acre every year.

The best managed State forests yield about 40 cubic feet per acre a year, which is low compared with the yield of some other European forests, such as those of Prussia, Saxony, or Württemberg.

The great achievement of France in forestry has been the establishment of protective forests where much destruction had been caused by floods and winds. From various causes large areas were cleared of forests toward the close of the eighteenth century, and only when it was too late was it realized that these lands were not fit for agriculture and should have been left in forest. To repair the mistake, a movement to reforest began in the nineteenth century. It was an exceedingly expensive mistake. Down to the present time, encouraged by wise laws, the State, the communes, and private landowners have restored to forest over 2,500,000 acres, and so saved them from ruin. In addition, the resulting forests return an excellent revenue.

Two-thirds of the torrents of Europe are in France. In the Alps, the Cevennes, and the Pyrenees mountains there are 1,462 brooks and mountain streams which are considered dangerous. Nearly a million acres of mountain slopes are exposed to erosion by these streams, to say nothing of the flat land below.

As far back as the sixteenth century there were local restrictions against clearing mountain sides, enforced by fines, confiscation, and corporal punishment. In the main these prevented ruinous stripping of hillsides, but with the French Revolution these restrictions were swept aside and the mountains were cleared at such a rate that disastrous effects were felt within ten years. By 1803 the people had become aroused to the folly of this cutting. Where useful brooks

had been there now rushed torrents which flooded the fertile fields and covered them with sterile soil washed down from the mountains. The clearing continued unchecked until some 800,000 acres of farm land had been ruined or seriously injured, and the population of eighteen Departments had been reduced to poverty and forced to emigrate. By 1860 the State took up the problem, but in such a way that the burden of expense for reforestation was thrown upon the mountaineers, who, moreover, were deprived of much pasturage. Complaints naturally arose. An attempt was made to check torrents by sodding instead of by forest planting. This, however, proved a failure, and recourse was again had to planting, by the law of 1882, which provides that the State shall bear the costs. Since then the excellent results of planting have completely changed public sentiment. The mountaineers are most eager to have the work go on and are ready to offer their land for nothing to the forest department. In addition to lands secured by gift, the State acquires 25,000 or 30,000 acres a year. Over 500,000 acres have been acquired and more than one-half of this area has been planted. Already 163 of the torrents have been entirely controlled and 654 are beginning to show the controlling effects of the forest on their watersheds. Thirty-one of the torrents now entirely controlled were considered hopelessly bad half a century ago.

It is expected that $50,000,000 will have been spent before the work of reforesting for protection is complete.

The sand dunes on the coast of France, mainly in Gascony, which the winds drove farther and farther inland, wasting the vineyards, have now largely been fixed in place by forest plantations which were begun in 1793. Of the 350,000 acres of sand dunes 275,000 have been planted in forest, and the dunes, instead of being a constant menace to the neighboring farmers, now are growing crops of pine which produce valuable wood and resin. In all, about $2,000,000 was spent in the work and an additional $700,000 was laid out in bringing the forests under administration. Now, though about one-half of the lands have been acquired by private persons and the State retains only about 125,000 acres, the State has received $120,000 above all expenses, and possesses a property worth $10,000,000, acquired virtually for nothing.

Some 2,000,000 acres of shifting sands and marshes toward the interior of the country, a triangular territory known as the Landes, has been changed from a formerly worthless condition into a profitable forest valued at $100,000,000. Reforestation was begun about the middle of the last century. This work was done principally by the communes, aided and imitated by private owners, and encouraged by the State. The resulting forest produces both pine timber and resin, upon the yield of which the present valuation is based.

La Sologne, in the central part of the country between the rivers Loire and Cher, was once densely wooded, but was for two centuries steadily deforested. By the beginning of the nineteenth century 1,250,000 acres had been utterly abandoned. Owing to the nature of the soil and subsoil, drainage was necessary as a first step toward reclaiming this land with forest. About the middle of the nineteenth century a committee of private citizens, under the presidency of the director-general of forests, began the work of reclamation. A canal 25 miles long and 350 miles of roads were built, and 200,000 acres of nonagricultural land were planted with pine. In spite of the fact that one of the species planted proved a failure and another kind of pine had to be substituted, the reforestation work has resulted in a forest property worth $18,000,000, and land which could be bought for $4 an acre fifty years ago is now yielding $3 an acre net annual revenue.

The arid limestone wastes of the province of Champagne have been partly reclaimed by forest planting. Two hundred thousand acres, planted at a cost of $10 per acre, have now risen in value from $4 to $40 per acre, with a total value of $10,000,000 and a net annual revenue of $2 per acre.

The private forests of France are being freely sold. Speculators buy them, strip them, and sell them for grazing purposes. In this way hilltops and hillsides are being rapidly denuded. This threatens erosion and the silting of farm lands in the valleys by the washing down of infertile soil. The terribly destructive floods of the present year could not have been so violent had the hills of France been kept clothed in forest.

In France, then, forestry has decreased the danger from floods, which threatened to destroy vast areas of fertile farms, and in doing so has added many millions of dollars to the National wealth in new forests. It has removed the danger from sand dunes; and in their place has created a property worth many millions of dollars. Applied to the State forests, which are small in comparison with the National Forests of this country, it causes them to yield each year a net revenue of more than $4,700,000, though the sum spent on each acre for management is over 100 times greater than that spent on the forests of the United States.

France and Germany together have a population of 100,000,000, in round numbers, against our probable 85,000,000, and State forests of 14,500,000 acres against our 160,000,000 acres of National Forests; but France and Germany spend on their forests $11,000,000 a year and get from them in net returns $30,000,000 a year, while the United States spent on the National Forests last year $1,400,000 and secured a net return of less than $130,000.

SWITZERLAND.

In Switzerland, which has 2,000,000 acres, or 20.6 per cent of its area, in forest, the communal forests are the largest, and make up 67 per cent of the total; the cantons own 4.5 per cent; and private persons own 28.6 per cent. The communal holdings are constantly growing by the purchase of private lands. The general government, or Bund, owns no forests. From $6,000,000 to $8,000,000 worth of wood (300,000 tons) and wooden ware are annually imported. This comes mainly from Austria-Hungary, southern Germany, and France.

The State forests yield about 64 cubic feet per acre, the corporation forests 42 cubic feet; the average yield of both together is about 45 cubic feet. The average wood growth per acre has been estimated to be 50 cubic feet. In the State forests of Bern the figures show a growth of 50 cubic feet for the plateau country, 73 cubic feet for the middle country, and 75 cubic feet in the Jura. Wood prices, which are higher than in Germany, have been rising for forty years.

The expenditures in forest management vary greatly among the Cantons, ranging from $1.50 to $7 per acre. The net annual returns range from $3 per acre in the forests where least is expended, to $8 or $9 per acre in the city forests, where most is expended.

Forest regulations came very early in Switzerland. The first forest ordinance of Bern was issued 600 years ago. The city forest of Zürich, famous as the Sihlwald, has been managed under a working plan since 1680, and is to-day one of the most perfectly managed and most profitable forests in the world. It yields, on the average, a clear annual profit of $12 an acre. From time to time, as the evidence shows, the Swiss people stood in dread of a timber famine. Ordinances were passed forbidding the reduction of the forest area, the making of clearings, and the exportation of wood from one Canton to another. In the middle of the eighteenth century, as modern industrial life began, various Cantons sought to follow the examples which Bern and Zürich had set in forestry. A severe flood in 1830 brought home the need of more vigorous measures in guarding against torrents. The floods of 1834 and 1868 further enforced the lesson. An investigation of Swiss forest conditions was ordered by the Bund in 1857, and the same year provision was made for an annual appropriation of $2,000 to the Swiss Forestry Association for engineering and reforesting work in the Alps. In 1871 the Bundesrath was empowered to carry on this work, with an annual appropriation of $20,000. After the flood of 1868 $200,000 of the collections made for the relief of the sufferers was devoted to reforestation. In 1876 the Bund assumed supervision of the water and forest police in the High Alps above a certain elevation, and undertook to

give aid in the work of engineering and reforesting for the control of the Alpine torrents. Since 1898 the Bund has supervised all this work, and in 1902 the present forest policy was firmly fixed by a revision of the existing law.

All the Swiss forests comprised in the Bund are now classified as protection and nonprotection forests. Whether public or private they are all controlled by the government. In protection forests all cuttings must be such as to preserve the protective value of the forest cover intact, and for this reason clean cutting is usually forbidden. In such forests stumpage sales are forbidden, and all wood must be felled and measured under the direction of a forest officer. Otherwise, privately-owned protection forests are supervised in the main as are those publicly owned. Nonprotection forests are also subject to a number of regulations. When they are in private hands clearings may be made only with consent of the Canton, logged areas must be reforested within three years, and existing forest pastures must be maintained.

Where protection forests can be created by planting, this may be ordered, and where forests are converted to farming land or pasture an equal area may be ordered reforested. Where barren ground is required to be forested for protective purposes, the Bund assists by paying from 30 to 50 per cent of the cost. Between 1876 and 1902 16,000 acres were reforested at a cost of $1,000,000, in round numbers, the Bund having paid one-half.

Grazing has been regulated for centuries. In protection forests it is entirely prohibited; but on all the rest of the forests great success has attended the efforts of the forest service to safeguard both pasturage and the forest by supervision and range improvement. Despite differences in local conditions, the experience of Switzerland in forest grazing is, therefore, strongly in support of the policies which are directing the efforts of our own Forest Service. Indeed, the experience of all Europe shows the necessity of controlling the public range.

To sum up, forestry in Switzerland, where every foot of agricultural land is of the greatest value, has made it possible for the people to farm all land fit for crops, and so has assisted the country to support a larger population, and one that is more prosperous, than would be the case if the valleys were subjected to destructive floods. In a country as small as Switzerland, and one which contains so many high and rugged mountains, this is a service the benefits of which can not be measured in dollars. It is in Switzerland also, in the Sihlwald, that forestry demonstrates beyond contradiction how great a yield in wood and money it may bring about if applied consistently for a number of years.

AUSTRIA AND HUNGARY.

AUSTRIA.

In Austria, which has been independent of the German Federation only since 1866, forestry has, in the main, followed German lines. Austria-Hungary is one of the largest exporters of wood, and the yearly exportations reach 3,670,000 tons. Germany takes more than half of these exports and the rest is distributed to Italy, Russia, and Switzerland.

Austria has 24,000,000 acres of forest, of which only 7 per cent belongs to the State and 58 per cent is private land. Communal and entailed forests make up the remainder. Of the private forests 34 per cent is in estates ranging from 20,000 to 350,000 acres in area, and for the last fifty years at least 75 per cent of the total forest area has been held in large, compact bodies. These large blocks are naturally favorable to forest management. Private forestry is further encouraged by the system of forest taxation, which relieves forests in which forestry is practiced. In the United States there are many enormous private forest holdings on which forestry would unquestionably be practiced were it not that excessive or ill devised forest taxation effectually discourages it.

The total net revenue from the Austrian State forests is over $5,000,000. The net yearly revenue per acre of 21 cents is comparatively low, due mainly to the facts that only 56 cents per acre is expended upon the forest and that most of the area is located in the rugged Alps and Carpathians, where administration and logging are costly.

The present forest department was started in 1872 in response to a popular outcry against the policy of selling State lands. That policy resulted in reducing the area of State forests from 10,000,000 to a little over 7,000,000 acres during the first half of the nineteenth century. The administration was reorganized in 1904, and now has three departments—administration proper, reforestation and the correction of torrents, and forest protection.

Forestry is successfully practiced on 60 per cent of all the Austrian forests and on 82 per cent of the private forests, and excellent results have been secured by cooperation between the State and private persons in forest management, particularly under the law of 1883. The most conspicuous fruit of Austrian forestry, however, is the reforesting of the "Karst." The Karst was a stretch of barren lands in the hilly country of Istria, Trieste, Dalmatia, Montenegro, and neighboring territory along the shores of the Adriatic Sea. It comprised some 600,000 acres. For centuries it had furnished the ship timbers and other wood supplies of Venice, but excessive cutting, together with burning and pasturing, the evil results of clearing, and the natural

condition of the land, had left it a waste almost beyond recovery. Many laws had been passed from time to time to stop the forest havoc, but without real effect till 1865. In that year the Government, persuaded by the forestry association, began to offer help to landowners who would undertake forest planting. Taxes were remitted for periods of years, technical advice was given, and plant material as well as money was supplied. Further laws were found necessary in 1882 and 1887 to meet the objections of stockmen. At the present time over 400,000 acres, or two-thirds of the Karst, have been brought under forest, in part by planting, at a cost of from $8 to $10 an acre, in part by protection and the natural recuperation so made possible.

This work has been carried on under the direction of the "forest protective service," which was first created for Tyrol in 1856 as a result of floods in the Tyrolese Alps in 1851 and was later (1871–1874) extended to the rest of the Empire. This service, which is distinct from the State forest administration, has also been especially helpful in encouraging private forestry. Though at first regarded with hostility, it is now held in high regard on the strength of the work it has done and is doing.

Harmony of interest between the State and private forest owners, which the whole Austrian forest policy favors, is notably secured by the encouragement of the wood export trade through such provisions as reduced freight rates, the absence of export duties, and moderate forest taxation.

A "reboisement" or reforestation law, based on that of France, was passed in 1884, to control torrents. This law carries an annual appropriation of $100,000, and the planting work, like that on the lands of the Karst, is carried on under the direction of the "protective service." For the regulation of the lower rivers $1,350,000 was appropriated at the same time, and of this sum $400,000 has been successfully expended on reforestation.

HUNGARY.

Hungary has 23,000,000 acres of forest, of which the State owns 16 per cent; corporations, 20 per cent; churches, cloisters, and other institutions, 7.5 per cent; and private persons the remainder. From $10,000,000 to $12,000,000 worth of wood is annually exported.

About half of all the Hungarian forests are under working plans, by which the cut is regulated so as to provide for a sustained yield, and the present annual cut of 1,000,000,000 cubic feet is believed to be considerably less than the wood actually produced. The State forests yield $600,000 net annual revenue.

The management of all corporation and protection forests has been supervised by the Government since 1879, and all so-called "absolute

forest land," in other words, land unfit for farming, must be reforested within six years after it is cleared. Three-fourths of all the forest land of Hungary, including private as well as public forests, falls under the classification of absolute forest land. Moreover, all mountain forests are required to be managed under State working plans. Two-thirds of all the Hungarian forests are brought under this sort of State supervision. Forest planting is encouraged by State nurseries, at which 10,000,000 seedlings are raised every year for free distribution, and by bounties paid for forest plantation established on private waste lands.

Hungary has some 600 square miles of shifting sands and waste lands, like those of the Landes of France. The work of reclaiming these was planned by the law of 1788. Actual planting was begun in 1817. By 1869, 20,000 acres had been forested, and parts of the plantations were beginning to yield a profit. The work of reforesting is constantly going on.

NORWAY, SWEDEN, AND DENMARK.

NORWAY.

Only 21 per cent, or 20,000,000 acres, of Norway is in forest. The State owns less than 2,000,000 acres of this. Of the forest region one-half has to import timber, one-fourth has sufficient for its needs, and one-fourth is able to export over 1,000,000 tons, valued at $18,000,000 a year. Nearly two-thirds of the exports go to England and most of the rest is divided up between Belgium, Australia, France, Holland, Germany, and Denmark. The total annual cut, one-fifth of which is exported, is about 500,000,000 cubic feet. It exceeds by 1,500,000 cubic feet the amount of wood grown by all the forest in the same time. In other words, the cut is far too heavy to last, so that a reduction of wood exports is inevitable.

Forestry is on a low level. The various provisions for the better use and protection of the forests, which began three hundred years ago, have been of too half-hearted a nature to meet the situation. There is a forest service, but the officers are few and underpaid, and the districts under their care—sometimes several million acres to each—are far too large for effective work. Moreover, there are difficulties over the forest rights which were earlier granted to encourage the development of the country, but which are now greatly in the way of establishing property rights and organizing an administration.

Since 1860 the State has been buying cut-over lands in order to plant them to forest where forest protection is needed, and from $15,000 to $20,000 a year has been spent in this way during recent years.

The communal forests are supervised by the Government, and are usually managed by the foresters with a view simply to supplying local needs. Sales outside the parishes are permitted only where there is more than enough for these needs.

SWEDEN.

Sweden has nearly 50,000,000 acres of forest, covering nearly 50 per cent of the total land area. Since the English import duties were abolished in 1866 the wood exports from Sweden have steadily increased, till now Sweden stands next to Russia, the world leader, in wood exports, with $54,000,000 worth a year, representing nearly 4,500,000 tons. England takes half of this, followed by France, Denmark, Germany, Holland, Cape Colony, Australia, and South America. The total cut from the forest is estimated to be near 1,000 million cubic feet.

The State owns about 13,500,000 acres, or 33.2 per cent, and controls 4,000,000 acres more. The State lands are, in the main, of lesser commercial value, and this fact, together with the existence of logging rights granted in the past, keeps the net income for the present down to 12 cents an acre. Nevertheless, since 1880 the net revenue from the State forests has risen from $300,000 to nearly $2,000,000 a year.

Up to five hundred years ago Sweden was overburdened by forests, but by that time cutting and wasting had gone so far that the willful setting of forest fires was forbidden. In 1638 overseers of communal forests were appointed in order to conserve supplies of wood for charcoal used in the iron industry. A general law followed in 1647, and a director of forests in the two southern districts was appointed in 1720. All through the eighteenth century, restrictions upon forest use were in force. Toward the close of the century there was, indeed, a premature scare over a possible timber famine. Yet, despite this legislation, and much legislation which followed, waste continued to go on. While measures were being passed to conserve the forests, the communal forests and town forests were actually being sold. It was not till the law of 1903, which went into effect in January, 1905, that a satisfactory policy was secured. In general, this requires the practice of forestry. As in Russia, provincial forest protection committees have to approve the local felling plans. A diameter limit is set, below which trees may not be cut. Clearings are forbidden, and cleared land, unless used for other purposes, must be reforested. Pasturing is restricted where it would do harm.

In the past thirty-five years the State has increased its forest holdings by 45 per cent through the purchase and reforesting of wastes and sand dunes and by the settlement of disputed titles. The purchases amount to over 600,000 acres, for which an average price of $5.30 an acre was paid.

Lumbering is carried on much as it is in the United States. The State, as a rule, sells stumpage, and the timber is removed by contractors. Management is by no means so detailed and intensive as in Germany or France. The trees which are to be cut are marked, but no attempt is ordinarily made to prepare complete working plans. Only a moderate amount of planting is done to secure the future crop, and natural reproduction is mainly relied upon.

Forest fires continue to do great damage, especially in the northern part of the country. A forest patrol is doing effective work, however, in checking the spread of fires.

DENMARK.

Denmark has about 600,000 acres under forest, of which the State owns over 23 per cent, or 142,000 acres. About 75,000 acres of wastes are in process of reforestation.

The need of wiser forest use was felt in the eighteenth century, and by 1781 the State forests were placed under administration. But the clearing of the forest continued at such a rate that in 1805 it was provided that the still existing forests of beech and oak should be maintained forever. Further, provision was made as to the selling of the peasants' farms, so that they should not be accumulated in large holdings upon which the peasants would have to depend for their wood.

Since 1820 the forest area has been increasing. At present reforesting is adding to it very considerably. Nearly 200,000 acres of heath have been planted in the last forty years. To this work of reclamation the State contributes $40,000 a year.

In State forests, as well as in the communal forests and the farmer's woodlots, forestry is carefully and profitably practiced.

RUSSIA AND FINLAND.

RUSSIA.

Russia's forests are of vast extent. More than 575,000,000 acres, or 39 per cent, of European Russia is forest, and the Siberian forests of Asiatic Russia contain about 350,000,000 acres. In the more wooded provinces of European Russia the Government owns about 89 per cent of the forest land. It owns 65.7 per cent of the total forest area. In general, the untouched forest resources of Russia comprise two-thirds of the whole forest area of Europe. Over $30,000,000 worth of wood is exported. The principal countries drawing upon Russia are, in order, England, Germany, Holland, and France.

From the 660,000,000 acres of State forests which are now being worked the net income is now nearly $21,500,000, or 3½ cents per acre.

Russia began to apply forestry before the time of want had arrived, though forest havoc had been wrought. She was not forced into it for self-protection, as were, for instance, Germany and France. The lessons mastered by such other countries were regarded by the Russian government as convincing enough without being actually experienced. The United States stands in a much less fortunate position with regard to forestry. With us the verge of a timber famine has already been crossed, and we are to know what it means to pay for forest waste. We have mortgaged the future of our forests. Yet it is still possible for us to regain our forest independence.

Attention was first turned to the protection of Russian forests about two hundred and fifty years ago, when Czars Michael and Alexis undertook to settle property rights and make provision against fire and theft. By the beginning of the eighteenth century more careful use of the forests, especially of those yielding ship timbers, was insisted upon by Peter the Great. The more immediate cause which led to the present administration was the forest devastation which followed the abolition of serfdom (1861) and the partition among the liberated serfs of much forest property. Complaints were rife in 1864, and several laws were presently promulgated, the last of which (1888) provides a comprehensive plan for the conservation of forests, public and private. The worst effects of devastation were felt in the southern districts near the steppes, where the soil and stream flow had been gravely injured by clearings. The law, however, which was passed directly as a result of these evils, applied to all European Russia, and has since (in 1903) been made applicable to the Caucasus, the Trans-Caucasus, and other southern provinces.

Forests which hold shifting sands or protect the shores of rivers, canals, and other waters, as well as those which serve to prevent erosion and avalanches in the mountain districts, are classed as protection forests, which may not be converted to agriculture or cleared or used as pasture. If of natural growth, protection forests are free from taxes forever; if planted, they are not taxed for thirty years.

Private forests not classed as protective may be cleared only on certain conditions, which, as a rule, provide for returning the land to forest or at least for offsetting the clearing by growing a plantation.

Over 100,000,000 acres of private forests have been placed under supervision as protection forests.

In each province and district there is a forest protection committee composed of local administrative officers, including one or two foresters, the justice of the peace or other justice, the county council, and

two elected forest owners, with the governor as president. These committees decide which forests are "protective" and which are not; approve working plans; direct what clearings may be made, and exercise police powers in cooperation with the local forest administration.

Private forest owners may secure expert advice on forestry without charge. Seedlings are distributed, and working plans for protective forests are made, free of cost. The Imperial Loan Bank advances money on forests for which the government has made working plans insuring conservative management. In this way 7,000,000 acres were mortgaged in 1900.

FINLAND.

Finland has 50,000,000 acres, or 63 per cent of the whole land area, in forest. It exports each year 170,000,000 cubic feet of wood, valued at $20,000,000, principally to England, France, Germany, and Holland.

Most of the forest—that is, between 35,000,000 and 45,000,000 acres—is State property. Since 1869 the State forests have been conservatively lumbered, but until the private forests are depleted it will not pay to make the management as thoroughgoing as it ought to be. Little can now be done beyond restricting wasteful cutting and fires. However, since no trees are cut which are less than 10 inches in diameter 25 feet from the ground, there will be a good stock of timber to count on when the inevitable rise of wood prices makes intensive management pay as it already pays where the markets for wood are better than the average. Working plans for the forests are constantly being made by a corps of forest surveyors.

Though mainly in small parcels, the private forests contribute four-fifths of the timber exported, in order to furnish which they are destructively overcut. Thus far all attempts to regulate their use have been vain, and they are certain soon to be exhausted.

Clearing along waters adapted for fishing, as well as clearing more than 12 acres anywhere without providing for new growth, have been forbidden since 1886.

INDIA.

The forests of India in the territory under British control cover nearly 180,000,000 acres, or 24 per cent of British territory. Of this a little over 149,000,000 acres are State lands, principally under forest. The rest of India, comprising 600,000 square miles, is made up of native states under British suzerainty, some of which have as much as 24 per cent under forest. Not all of the British State forests will remain under State control, since those now under management include three classes of forest, namely, reserved, protected, and unclassed, of which only the reserved forests are permanent. The

reserved forests now comprise 9.5 per cent of the state forests. In the course of time, it is expected, they will comprise at least 15 per cent of the total area of British India. The value of forest products annually exported is over $144,000,000. The annual net revenue from the State forests has risen in forty years from $240,000 to $3,300,000.

The coming of forestry in India was the result of peculiar local conditions which differed in many respects from those of older forest countries. Among these were the practically complete dependence of the people upon wood, the aggravated wastefulness of forest cutting, and a shortage of the teak wood required for the British public works at Bombay and other places. Many difficulties beset the way of reform when reform was forced upon the government. The ignorance and wastefulness of the natives, the destructive popular rights to the use of the forests for wood and pasture which had grown up during the ages under loose native administration, and the lack of a central authority strong enough to enforce regulation, all helped to make the situation a difficult one. Yet the Indian forest service is one of the most efficient in the world. The right of the State to intervene for the general welfare by protecting and developing the forest has been clearly recognized and successfully applied. This is the reverse of the case in Great Britain.

In the size of the country, the variety of the climates, the old habits of forest waste, the damage done by fire, the existence of arid regions and deserts, the problem of floods, the importance of grazing, the possibilities of irrigation, and, finally, the extent of the national forests (India 149,000,000 acres, the United States 160,000,000 acres), Indian forestry has broad lines of resemblance to forestry in the United States. Of the cultivated acreage 30,000,000 acres depend upon irrigation. But the differences between the conditions in the two countries are no less striking. The backward industrial stage of India, the fact that 70 per cent of its population are engaged in agriculture, its lack of available coal and the consequent dependence of the people upon wood for fuel, and the exceptional character of its forest products, clearly indicate that progress in forestry can not move so rapidly there as here.

Great areas must be kept under forest in India in order to supply local demands. Although the coast line is long, the country is so large that wood importations would generally involve very long hauls, which would greatly add to the cost of wood. In this respect the railway has not brought the changes which have followed it in other countries. Instead of carrying in foreign wood to supply home production the railways have themselves made fresh demands for local construction material, and instead of carrying in new fuel they have in many cases drawn upon local wood for their own fuel. Iron mines are not conveniently located, so that wood must long con-

tinue to be used in place of iron and steel in construction. In addition to the forest area needed to supply fuel, twice that area ought to be maintained in forest for construction timber, boat building, tools, implements, public works, railways, etc. One-half an acre of forest per head of population will be needed to meet all these demands. This would call for 17 per cent of the total area of the British provinces; and the other large demands for minor products, principally range and grass, would raise the minimum requirements for forest to 25 per cent of that area. Since, at the best, not more than 15 per cent of British India is likely to become State forest lands, the need of broadening the field of forest management is very obvious.

The need of what the English term "forest conservancy" was felt at the very beginning of the nineteenth century on account of the difficulty in securing the timber required for public works. A timber agency was established at Bombay, but was abolished in 1823 because of friction with local civil officers. In 1843 the protection of teak forests was vigorously agitated, and a teak plantation was started which is now well known as the Nilambur teak plantation. A conservator of forests was appointed in Bombay in 1847. Forest conservancy was commenced in Mysore in the same year, and in 1856 a conservator of forests was appointed in Madras. The first comprehensive forest policy for India was, however, laid down in 1856 by Lord Dalhousie, who, at the close of his administration, appointed the celebrated Sir Dietrich Brandis to the post of superintendent of the forests of Pegu, which had been annexed by England. By dint of persistent effort Brandis succeeded in carrying through measures to protect the supplies of teak in the Burma forests, which now yield an annual net revenue of $810,000, and became the first inspector-general of forests. From that time the various other presidencies have been putting forestry into practice, and the forest laws of 1865 and 1878 complete the legislation necessary to carry on the present successful forest department.

Forest fires were always exceedingly destructive in India, but since 1860 protective measures have been so improved that an area of 3,500,000 acres, or 36 per cent of the area of reserved State forests, is now effectively protected against fire. The protected area is to be steadily increased.

Working plans for 3,000,000 acres are being carried out, and plans for a million acres more are being prepared.

Since forest planting was begun, more than sixty years ago, 128,000 acres have been planted, about one-half of which, consisting of teak, will materially increase the output of teak from Burma hereafter.

The State forests are handled on the principle of a sustained and increasing yield. Both natural reproduction and artificial planting

are used to keep up the forest growth as areas are cut over. The large increase of the net returns shows how effectively this system of management is working.

JAPAN.

Japan has nearly 58,000,000 acres, or 59 per cent of its total area, under forests. The State owns nearly 33,000,000 acres (56.8 per cent); the Crown nearly 5,250,000 (9.1 per cent); municipalities over 4,250,000 (7.5 per cent); shrines and temples nearly 500,000 (0.7 per cent), and private owners nearly 15,000,000 (25.9 per cent). Although more timber is imported than is exported, Japan exports nearly $1,250,000 worth of wood and $4,250,000 worth of matches. The net revenue from the State forests has risen 16 per cent in the past twenty years, and is now $8,000,000 a year.

Under the old feudal system of Japan the forests were for centuries reserved and cared for, and a continuous policy was assured. In fact, Japanese forests have been managed longer than any of those of Europe. They were controlled before the birth of Christ, and during the early Christian centuries forest planting on watersheds to prevent floods was enforced by frequent edicts, and the felling of trees was supervised by officers of the provinces. As a result, Japan alone among the nations began modern industrial progress with its forests not only unimpaired but improved after centuries of use.

When, in 1868, the feudal Government of the Shoguns passed away and the Mikado was restored to power, the old restrictions were removed and the forest was over-used wherever it was within easy reach of the market. Ten years later public-spirited men demanded the reservation and administration of national forests. By 1882 a first draft of forest laws was prepared by officers who had been trained as foresters in Germany, and, after preliminary legislation, the general forest law of 1897 resulted. Under this law the State and Crown forests are administered and the cutting of private, municipal, and religious forests is regulated. A part of the expenses of administration is paid out of a special fund secured by the sale of certain small State forests which it is not desired to retain. These sales return about $1,000,000 a year, which is spent in forest improvement work, including surveys, planting, and the preparation of working plans. The State forests of Japan produce about 2,000,000,000 cubic feet a year.

There are two classes of forest, called "reserve" and "available" forests. The first are guarded from reckless felling which would expose the soil to injury. The second are intended to be developed to their fullest capacity as a source of wealth for the country.

During the past twenty-five years 200,000 acres of forest have been planted at an average cost of a little less than $9 per acre.

Private forests are under Government supervision. Where they protect mountain slopes they can not be cleared without permission, but must be handled so as to keep the forest cover intact.

The Japanese forests are administered in many ways like our own. The personnel is made up of trained men. Up to recent years Japanese students of forestry had to be educated abroad. Now, however, they may receive thorough instruction in their own country.

ITALY.

Italy has some 10,000,000 acres of forest, nearly 15 per cent of the land area, and one-third of an acre for each inhabitant. The State owns only 4 per cent of this; communal forests cover 43 per cent, and private forests 53 per cent. Wood valued at $14,000,000 (420,000 tons) is imported every year, and wood importations have doubled in the last decade.

Most of the forests of the country are exceedingly poor. Nearly half of them are made up of coppice woods or young stump shoots, which yield but little besides the small wood used for fuel and charcoal. Eighty per cent of the wood produced at home is small wood of this character. Wherever timber of good size is within reach the forest has been devastated. Indeed, existing forests are so far gone that much time and outlay will be necessary to increase their productiveness.

Italy has suffered extremely from the ruin which follows the removal of protective forests. One-third of all the land is unproductive, and though some of this area may be made to support forest growth, one-fourth of it is beyond reclamation, mainly as the result of cleared hillsides and the pasturing of goats. The rivers are dry in summer; in spring they are wild torrents, and the floods, brown with the soil of the hillsides, bury the fertile lowland fields. The hills are scored where the rains have loosened the soil, and landslides have left exposed the sterile rocks, on which no vegetation finds a foothold. Such floods as that of 1897, near Bologna, which did over $1,000,000 damage, destroy property and life.

The dearth of wood and especially the great need of protection forests to control stream flow have brought some excellent forest laws. In spite of the first general forest law (1877), which regulated cutting and forbade clearing on mountain slopes, large areas have persistently been cleared, and though provision has been made for thorough reforesting work, very little of the needed planting has been done. The classification of the lands to which restrictions shall and shall not apply is a constant matter of dispute. An effort has been made to show that the forest planting contemplated by law is largely unnecessary. The last point, however, has been safely settled by

recommendations of a recent commission, which declare that at least 500,000 acres will have to be planted at a cost of not less than $12,000,000 before the destructive torrents, brought on by stripping and overgrazing the hillsides, can be controlled.

Italy has found it too expensive to enforce her forest laws. She is finding it many times more expensive to leave them unenforced.

SPAIN AND PORTUGAL.

SPAIN.

Spain has only about 12,000,000 acres under forest, about seven-tenths of an acre for each inhabitant. Practically all of this is State land. Thirteen and one-half million dollars' worth of wood products are imported every year. Lesser forest products, such as cork, tan-bark, and nuts, are exported.

Spain has suffered very greatly from destructive floods caused by insufficient forest cover in mountain country, and has enacted rather elaborate laws to prevent overcutting and to reforest clear areas. But anxiety to get the country out of debt has, on the other hand, led to the sale of forest land and to much disagreement over the classification of forest land needed for wood supplies and protective cover. With laws nearly as good as those of Italy, Spain is much further from accomplishing actual results in forestry.

PORTUGAL.

Portugal has about 80,000 acres of State forest land. Thirty thousand acres of this consists of sand dunes which are being made productive by forest planting. In the very poorest part of the country there is a planted pinery of about 25,000 acres which produces good returns in timber and naval stores. There is an excellent law for the encouragement of reforesting work, with liberal appropriations.

SLAVIC KINGDOMS.

The Slavic States of Bulgaria, Servia, Montenegro, Roumelia, and Roumania, controlled by Turkey for centuries, were made independent kingdoms by the Congress of Berlin in 1878. Roumelia was joined to Bulgaria in 1885. So far Roumania alone has availed herself of her new freedom to provide for the wiser use of her forest resources.

ROUMANIA.

The forests of Roumania were depleted while the country was under Turkish rule, and only between 17 and 20 per cent of the land is now wooded. In 1881 the first effective law was passed. The State royal and communal forests are now placed under management, and such private forests as are located on steep slopes and near streams

are supervised. This plan of protection covers 84 per cent of the whole forest area. In these forests clearings can be made only by permit and all cutting must be done in accordance with approved working plans. Over 200,000 acres of State forests and 500,000 acres of private forests are now more or less completely organized. The main obstacle in the way of perfecting forest management is the lack of transportation facilities. Only 65 per cent of the State forests can now be worked.

Since 1892, 2 per cent of the gross returns from the forests have been set aside as a forest improvement fund.

The State forests yield about $1,000,000 a year, a net return of 30 cents per acre. The State has reclaimed 18,000,000 acres of sand dunes by forest planting and has forested 9,000 acres of other land. The forest nurseries in which the stock is grown cover 330 acres.

Some of the large private forests, particularly that of Princess Schoenburg, are carefully managed.

The government distributes forest seeds and seedlings to communes, corporations, and schools. For four years past foresters have been sent to Austria, Germany, and France for the purpose of studying the methods of forest planting followed in those countries, and many students have been placed in the western forest schools, who later will enter the Roumanian forest administration.

CHINA.

China holds a unique position as the only civilized country which has persistently destroyed its forests. What forestry has done in other countries stands out in bold relief against the background of China, whose hills have been largely stripped clean of all vegetation and whose soil is almost completely at the mercy of the floods. Trees have been left only where they could not be reached. Almost the sole use for lumber is the manufacture of coffins. The heavy 2 or 3 inch planks for this purpose are so scarce, and the cost of transporting them by coolies is so high, that they sell for $2 or $3 apiece.

Nowhere in the world is the forest cleaned off down to the very soil as it is in China. When the trees are gone the saplings, the shrubs, and even the herbage are taken. Slender poles are used to build houses; inconsiderable shrubs are turned into charcoal. In the lower mountains of northeastern China, where the stripping process has reached its extreme phase, there is no trace of anything worthy of the name of forest. In the graveyards and courts of the temples a few aged cedars have been preserved by the force of public opinion, and poplars and fruit trees planted about dwellings are protected as private property by the peasant owners.

In the province of Shantung, where deforestation is practically complete, fuel and fodder for cattle are literally scratched from the

hillsides by boys who go out from villages with their iron rakes in autumn to secure winter supplies. Grazing animals, searching every ledge and crevice, crop the remaining grass down to the very roots.

A dearth of wood is not the only forlorn result of forest devastation; a dearth of water and the ruin of the soil follow in its train. In western China, where forest destruction is not yet complete, enough vegetation covers the mountains to retard the run-off of the rains and return sufficient moisture to lower levels, where it can be reached by the roots of crops and where springs are numerous. But on the waste hills of eastern China the rains rush off from the barren surfaces, flooding the valleys, ruining the fields, and destroying towns and villages. No water is retained at the higher levels, so that none is fed underground to the lower soils or to the springs. As a result, even on the plains the water level is too far beneath the surface to be used. Without irrigation and the ingenious terracing of hillsides, by which the rains are made to wash the soil into thousands of miniature fields whose edges are propped up by walls, agriculture would be entirely impossible. Even irrigation calls for the immense labor of drawing the needed water from wells.

In a word, the Chinese, by forest waste, have brought upon themselves two costly calamities—floods and water famine. The forest school just opened at Mukden is the first step in the direction of repairing this waste so far as it now may be repaired.

CANADA.

About one-third of the Dominion of Canada, 1,249,000 square miles, or nearly 800,000,000 acres, is classed as woodland, though the area stocked with commercial timber probably does not exceed 260,000,000 acres. The net exports of wood are over 2,000,000 tons a year—more than double those of the United States. The per capita consumption is high—60 cubic feet a year for timber and 132 cubic feet for fuel. A forest office in the department of the interior has been established since 1899, and since 1901 a protective service of fire rangers has been organized in some of the Dominion lands, with excellent results. Farmers and others, particularly in the central prairie regions, have been supplied free of charge with 7,000,000 seedlings for forest plantation.

In the Dominion and the Provinces, together, 203,500,000 acres have been made "forest reserves." The porportion of land in these reserves which at present bears merchantable timber is, however, in many cases small. Thus, while the reserves of British Columbia, recently created, nominally cover 100,000,000 acres, it is believed that not more than one-tenth of this area has a growth of commercial timber.

TURKEY.

In spite of the fact that there are large and valuable forests in Turkey, Macedonia alone having at least 5,000,000 acres, Turkey is without forestry. Much of the forest is difficult of access, and the rest of it is devastated.

THE CHIEF LESSONS OF FORESTRY ABROAD.

What forestry has done in other countries shows, first of all, that forestry pays, and that it pays best where the most money is expended in applying it. Both these points are very clearly brought out in the following table:

Expenditures and revenues of national forests, showing higher productiveness under larger expenditures.[a]

Country.	Total net revenue from Government forests.	Expenditure per acre.	Net revenue per acre.
Württemberg	$3,098,428	$2.05	$3.60
Saxony	2,209,000	3.00	5.30
Baden	829,162	3.58	4.42
Hesse	744,209	1.25	4.29
Switzerland	237,663	1.32	2.55
Prussia	17,054,144	1.58	2.50
Bavaria	5,128,348	1.99	2.22
France	4,737,250	.95	1.75
Italy			.38
Hungary		.34	.32
Austria	5,313,000	.56	.21
Roumania	482,600		.18
Spain			.17
Sweden	1,677,672	.02	.09
Russia	21,500,000	.01	.032
United States {1905–6	[b] 12,000	.007	[b] .0001
United States {1906–7	128,659	.0093	.00086

[a] Prepared from the latest available data. [b] Deficit.

It is plain that the United States is enormously behindhand in its expenditure for the management of the National Forests, but that nevertheless returns have already increased with increased expenditure for management.

A second lesson, clearly brought home by foreign forestry, is the need of timely action, since forest waste can be repaired only at great cost.

Third, private initiative does not suffice by itself to prevent wasteful forest use. England, it is true, has so far consistently followed a let-alone policy. However, England has been depending upon foreign supplies of wood. Now that all Europe is running behind every year in the production of wood (2,620,000 tons) and there are unmistakable signs that countries which lead as exporters of wood will have to curtail their wood exports, England is at last feeling her dependence and is speculating uneasily as to where she can certainly secure what wood she needs in the future.

Fourth, when the forest countries are compared as to wood imports and exports, and when it is realized that a number of the countries which practice forestry are even now on the wood-importing list, the need of forestry in the export countries is doubly enforced.

Net wood imports and wood exports of forest countries.[a]

[Average data, calculated from the returns of five years.]

Country.	Imports.	Exports.	Country.	Imports.	Exports.
	Tons.	*Tons.*		*Tons.*	*Tons.*
Great Britain and Ireland	9,290,000		Mauritius	20,000	
Germany	4,600,000		Servia	15,000	
France	1,230,000		Ceylon	10,000	
Belgium	1,020,000		Japan	5,000	
Denmark	470,000		West India, Mexico, Honduras, etc.		13,000
Italy	420,000		West Coast of Africa		28,000
South America	330,000		India		55,000
Spain	210,000		Roumania		60,000
Egypt	200,000		United States		1,020,000
Holland	180,000		Norway		1,040,000
Switzerland	170,000		Dominion of Canada and Newfoundland		2,144,000
Australasia	160,000		Austria-Hungary		3,670,000
Cape of Good Hope	150,000		Sweden		4,460,000
Portugal	60,000		Russia, with Finland		5,900,000
Natal	50,000				
Bulgaria	50,000				
China	50,000		Total	18,725,000	18,390,000
Greece	35,000				

[a] From tables in Schlich's Manual of Forestry, vol. 1, 3d edition.

Russia, Sweden, Austria-Hungary, and Canada, for instance, are making good the wood deficit of a large part of the world. Sweden cuts much more wood (106,000,000 cubic feet) than she produces; Russia, in spite of her enormous forest resources, has probably entered the same road; and England, the leading importer of wood, must count more and more on Canada. But the United States consumes every year from three to four times the wood which its forests produce, and in due time will doubtless take all the wood that Canada can spare. In other words, unless the countries of the western hemisphere apply forestry promptly and thoroughly, they will one day assuredly be held responsible for a world-wide timber famine.

Fifth, in comparison with foreign countries the prospects for forestry in the United States are particularly bright, for the following reasons:

(1) We start with the assurance that success may certainly be attained.

(2) We have few of the handicaps which have trammeled other countries. We have no ancient forest rights and usages with which to contend, or troublesome property questions to settle.

(3) The results which other lands have achieved by long struggle, often with bitter costs, are free to us to use as we wish. We have, it is true, our purely National and local forest questions, but the key to many of them is somewhere in the keeping of the countries which have achieved forestry.

(4) In variety combined with value our forests are without a parallel in the world. They produce timber adapted to the greatest variety of uses, so that, except to meet shortage, importations of wood are unnecessary. Furthermore, transportation facilities enable us to make every forest region available. Thus, by specializing our forest management, each kind of forest may be made to yield the kind of material for which it is best adapted, and the wastes due to compulsory use of local supplies may be practically eliminated.

Approved:

JAMES WILSON, *Secretary.*

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